Hand-held powered combined reciprocating saw and jigsaw

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Applicant: B & Q PLC (GB)
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Abstract of **GB2380706**

A hand-held powered combined reciprocating saw and jigsaw comprises a main body 3 having a first longitudinal edge 9 extending between front and rear ends 5, 7, and an elongate saw blade 11 extending from the front end generally adjacent the first longitudinal edge and arranged to carry out a reciprocating sawing motion. The saw includes a first handle 13 located generally at the rear end of the main body and oriented substantially perpendicular to a cutting edge 15 of the saw blade. The first handle has a predetermined length L, and the distance D between the first handle and the front end of the main body is no greater than three, but more preferably no greater than two, times the length of the handle. Preferably the saw comprises a second handle 17 inclined to the cutting edge of the saw blade and located closer to the front end of the main body. The saw may be cordless, and may include a guard 25 extending substantially perpendicular to the cutting edge.

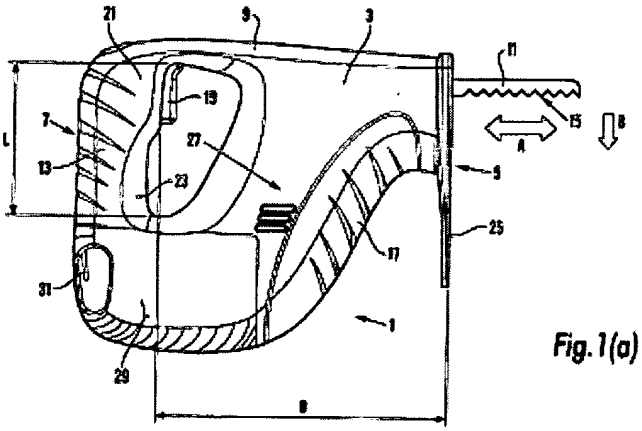

Fig.1(a)

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GB 0792188 US 4240204

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(54) Improvements in and relating to power saws

(57) A hand-held power saw includes a housing (1) accommodating a drive motor (2) and a drive mechanism for reciprocating a saw blade (6) along the lower edge of a tapering saw blade support (5) that extends from the housing (1). The drive mechanism includes a counterbalance device for counterbalancing linear out-of-balance faces created during use by the saw blade and its drive mechanism. An additional bearing means (46) for the saw blade is located in the tapering support (5).

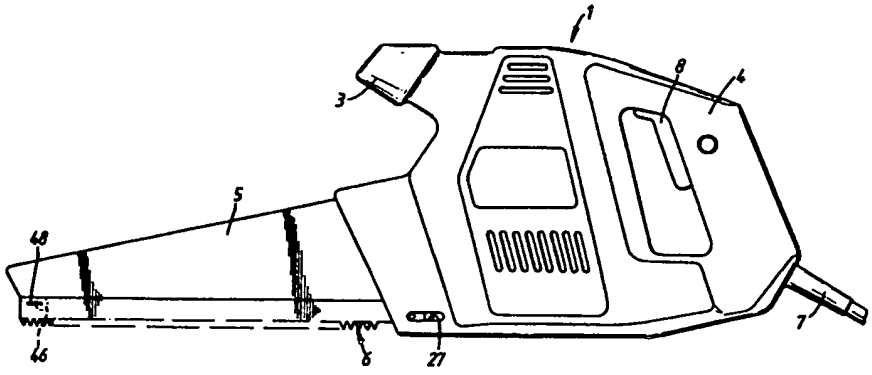

FIG. 1.

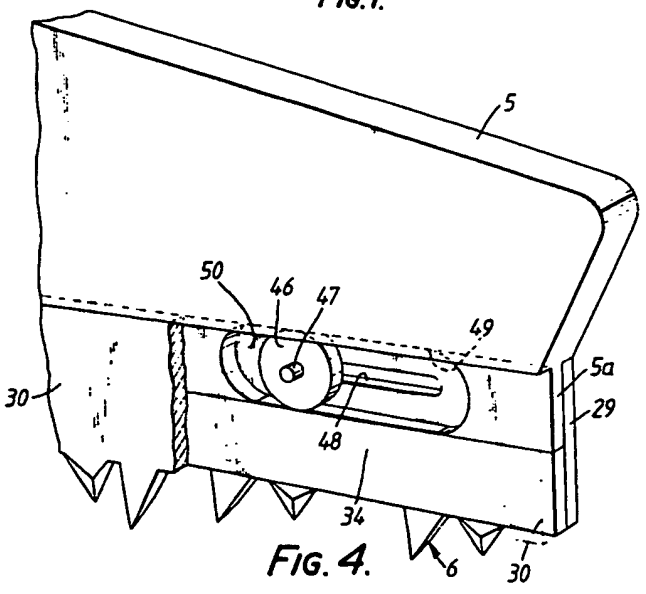

FIG. 4.

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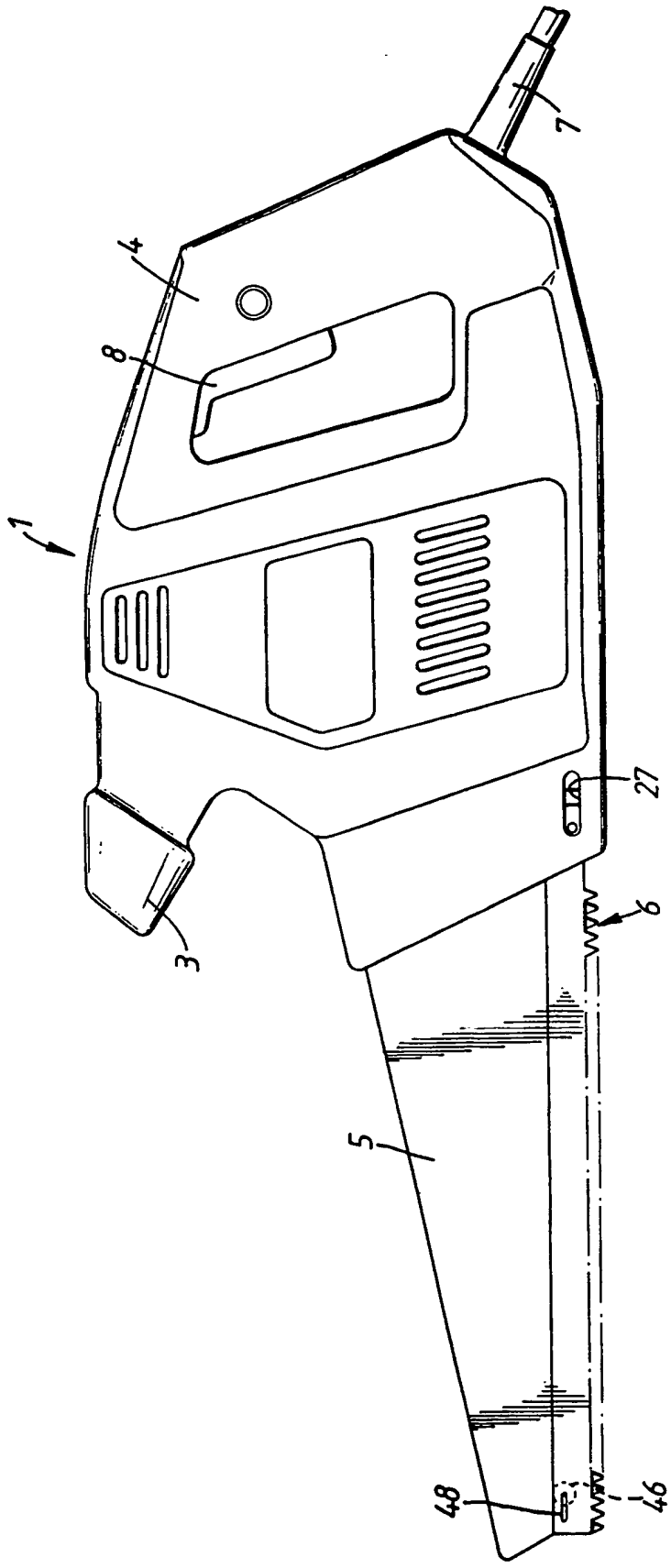

FIG. 1.

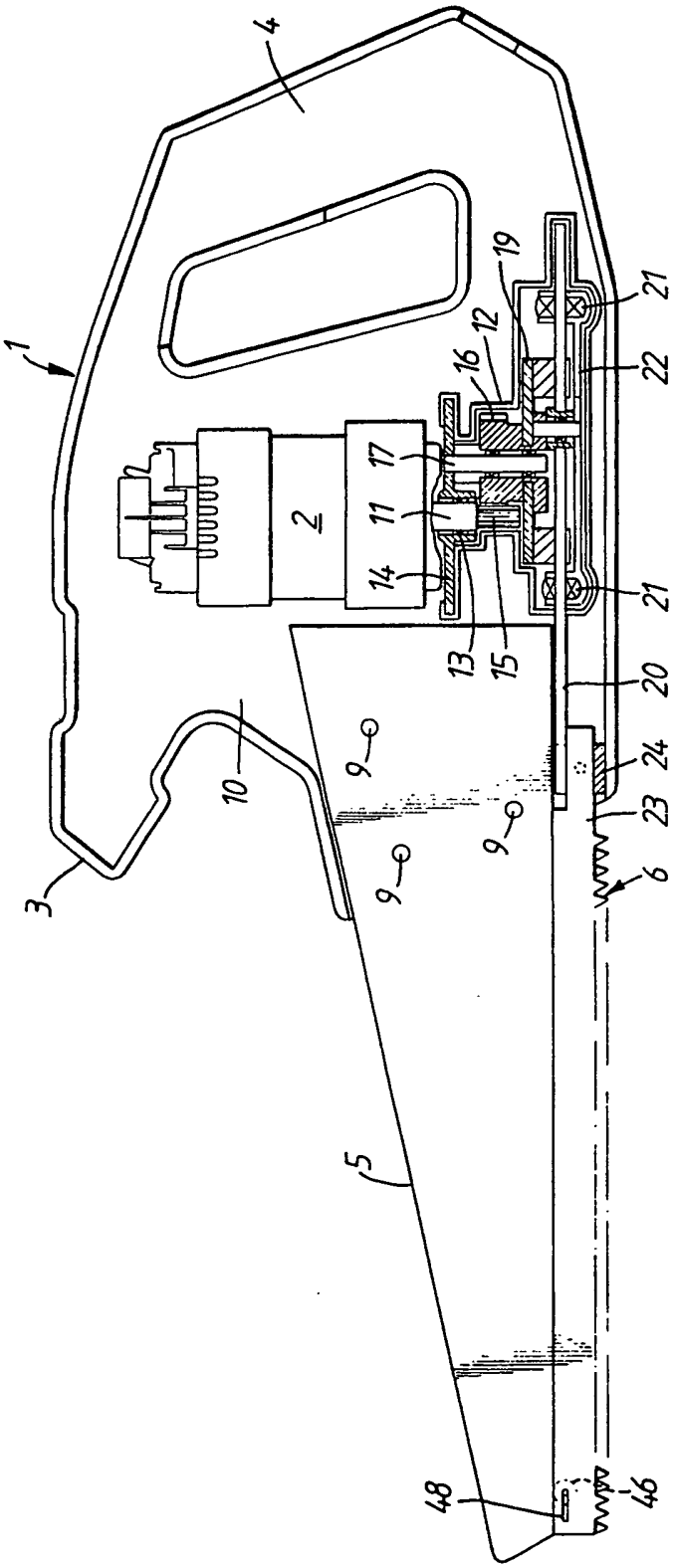

FIG.2.

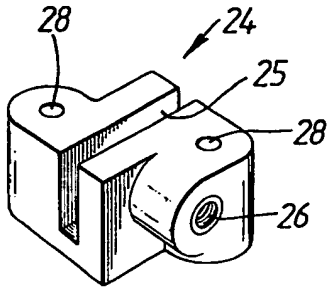

FIG. 3.

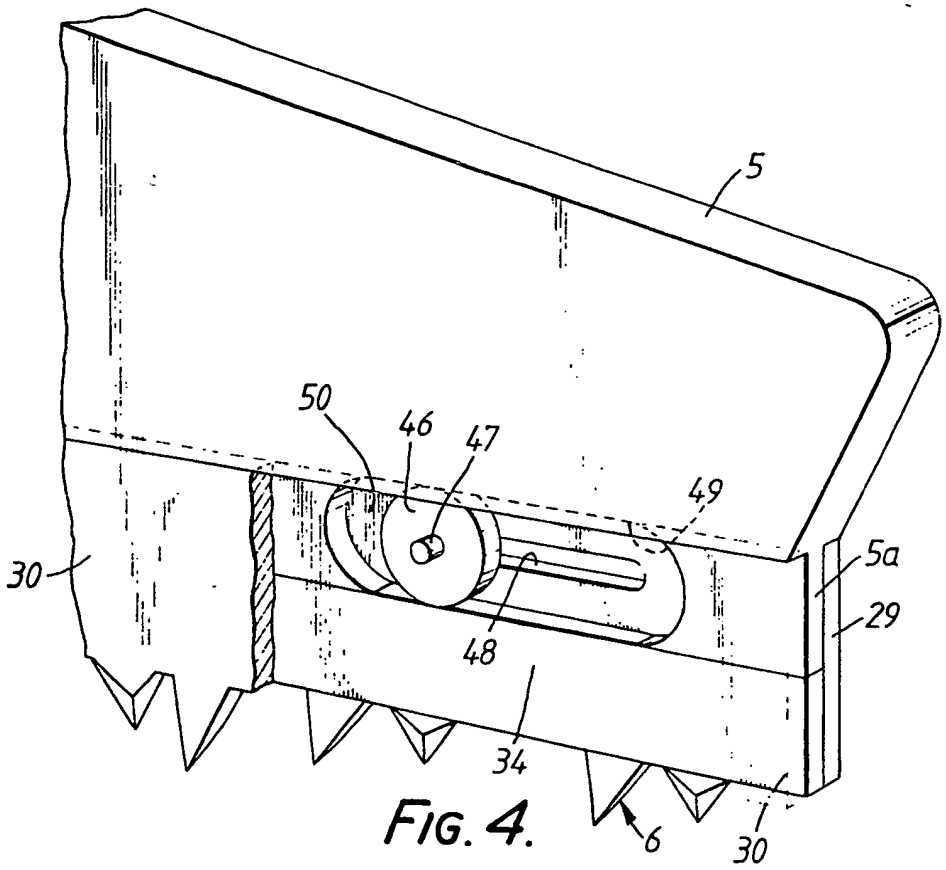

FIG. 4.

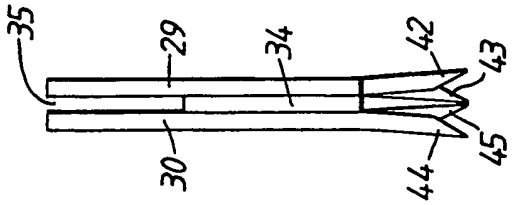

FIG. 6.

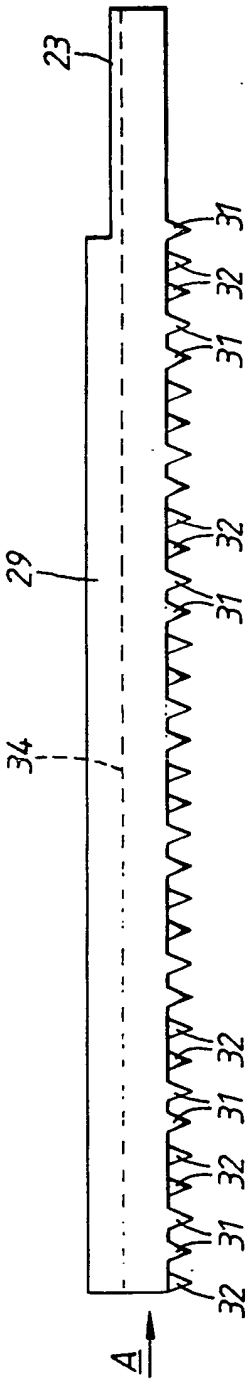

FIG. 5.

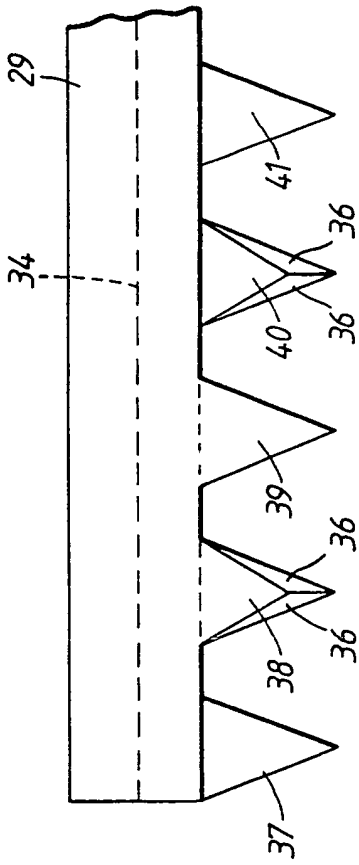

FIG. 7.

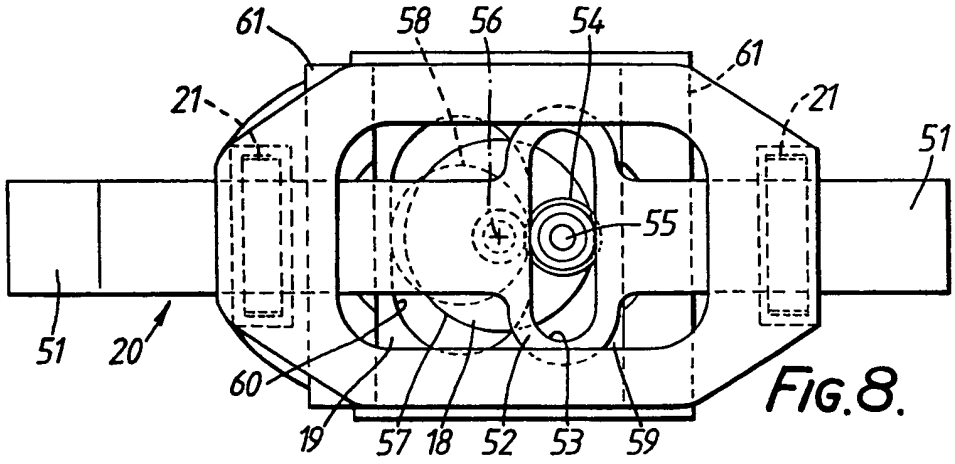

FIG.8.

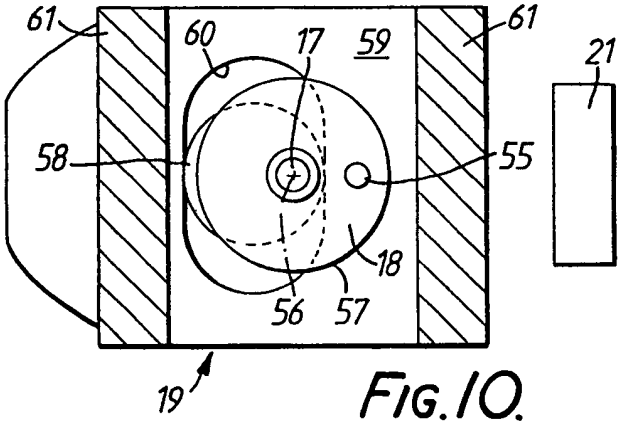

FIG.10.

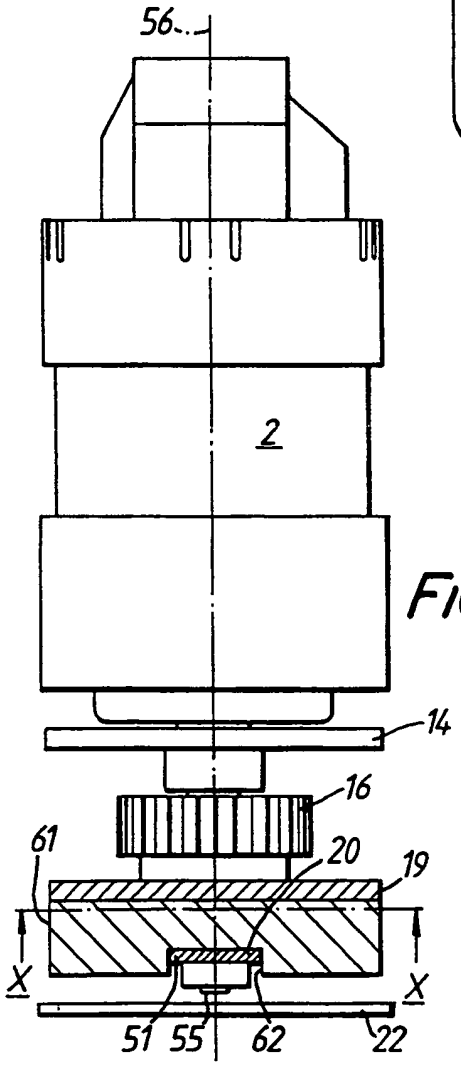

FIG.9.

SPECIFICATION

Improvements in and relating to power tools

This invention relates to power tools and has particular reference to power saws.

It has been proposed to provide a power saw in which a saw blade is driven to and fro along a blade support by a drive mechanism. However, the method of supporting the saw blade gives rise to frictional resistance particularly when a user exerts pressure on the support.

According to the present invention, a power saw comprises a housing, a saw blade support extending from the housing and having surfaces for supporting and guiding a saw blade, means in the housing for reciprocating the saw blade along the support, and, bearing means additional to the said surfaces between the support and the saw blade.

The bearing means may be accommodated in the support member or in a saw blade assembly and may be located at or adjacent that end of the support member remote from the housing.

The bearing means may comprise a bearing disc which may be housed in a cut-away in the support member.

The disc may be carried upon a spindle whose ends are located in slots in the saw blade.

Alternatively, the bearing disc may be carried upon a spindle whose ends are located in slots in the saw blade support member.

By way of example only, an embodiment of the invention will now be described in greater detail with reference to the accompanying drawings of which:

Fig. 1 is a side view of a power saw embodying the invention,

Fig. 2 is a side view of the saw of Fig. 1 with the housing part and other components removed,

Fig. 3 is a perspective view of a clamp,

Fig. 4 is a perspective view of part of a saw blade assembly and a support,

Fig. 5 is a side view of a saw blade assembly,

Fig. 6 is an end view in the direction of arrow A, Fig. 5, of the saw blade assembly,

Fig. 7 is a side view on an enlarged scale of part of the saw blade assembly,

Fig. 8 is a plan view of part of the drive mechanism of the saw,

Fig. 9 is an end view in schematic form and partly in section of the drive mechanism, and,

Fig. 10 is a section on the line X-X of Fig. 9.

The saw, shown in Figs. 1 and 2 comprises a housing 1 which may be of the so-called clam shell construction. The housing 1 is formed to accommodate a driving motor 2 and to provide a forward knob-like handle 3 and a rear handle grip 4 so that the saw can be hand-held by a user.

Extending forwardly from the housing 1 is tapering support 5 along whose lower edge moves a saw blade assembly 6 connected at one end within the housing 1 to the drive mechanism described below. The saw blade assembly is described in more detail below.

The motor 2 is energised via a power lead 7 from a suitable power source, energisation being controlled by a switch (not shown) actuable by a trigger 8.

Fig. 2 is a side view of the power saw with one clam-shell half and other components removed to reveal the essential elements of the driving mechanism for reciprocating the blade assembly.

Fig. 2 also shows the way in which the support 5 is held in position. At its wider end, the support 5 has three spaced holes 9 in which locate pins pressed into recesses in the clam shell half 10.

Seated upon internal ribs (not shown) formed on the internal surface of the clam shell half 10 is the electric motor 2 whose rotor shaft 11 extends downwardly into a housing that may be formed integrally with the clam shells and that is indicated diagrammatically at 12. The lower end of the rotor shaft 11 is supported by a bearing 13 held in a support member 14.

Formed on the extreme lower end of the rotor shaft 11 is a pinion 15 that is meshed with a gear wheel 16 of the driving mechanism and which is rotatably mounted upon a shaft 17 secured, at its upper end, in the member 14. The gear wheel 16 has secured to it, or formed integrally therewith, a driving member 18 with components that impart reciprocatory movement to a counterbalance device 19 and a driving member 20 respectively. Bearings 21 support the member 20 for reciprocatory movement and are supported in a base member 22 seated in the housing 12.

The forward end of the member 20 projects from the housing 12 beneath the support 5 where it is detachably secured to a reduced end portion 23 of the saw blade assembly 6 by a clamp 24 shown in more detail in Fig. 3.

The clamp 24 is of generally cubic form with a slot 25 for the reception of the reduced width end portion 23 of the assembly 6. The clamp 24 has a threaded hole 26 transverse to the slot 25 for the reception of a screw (not shown) which grips and holds the reduced width end portion 23 in the slot. Access to the securing screw is permitted via a slot 27 in the housing of the saw thereby enabling a user readily to remove and attach a blade assembly. Further fixing holes 28 on the upper face of the clamp enable the latter to be secured to the forward end of the member 1 by screws which pass through the latter and into the holes 28. Other methods of fixing the blade assembly to the drive member 1

may be used instead.

The saw blade assembly is a laminated structure that may comprise two blades secured together one on each side of an inner strip.

The saw blade assembly shown in Figs. 5-7 comprises a laminated structure formed of two outer strips 29, 30 formed with teeth 31, 32 respectively along their lower (as viewed in Fig. 5) edges. The right-hand (as viewed in Fig. 5) end portions of the strips 29, 30 are of a reduced depth as compared with the remainder of the strips and as indicated at 23. There are no teeth along the lower edge of the reduced depth portions.

The outer strips 29, 30 are separated by an inner strip 34 whose depth is considerably less than that of the major parts of the strips 29, 30 and slightly less than the depth of the portions 33. The inner strip 34 is so located that its lower edge (as seen in Figs. 5 and 7) is level with the roots of the teeth 31, 32 thus forming a longitudinal gap 35 between the upper parts of the strips 29, 30.

There is thus formed a saw blade assembly in which the roots of the teeth 31, 32 are spaced from one another laterally by a gap equal to the thickness of the inner strip 34.

The teeth 31, 32 are of triangular form when seen in side elevation as in Figs. 5 and 7, the bases of the triangles forming the roots of the teeth. The teeth are arranged in pairs on each strip and the sloping edges are bevelled as indicated at 36 to form points at the tips of the teeth. Thus, the extreme left-hand tooth 37 shown in Fig. 7 is the first of the teeth 32 and is bevelled on its outside face. The next tooth 38 is the first of the teeth 31 and is bevelled on its outside face, the next tooth 39 is the second of the teeth 31 and is bevelled on its inside face. The next tooth 40 is second of the teeth 32 and is bevelled on its inside face whilst the next tooth 41 is the third of the teeth 32 and is bevelled on its outside face and so on. The bevels taper towards the edges of the teeth as can be seen from Fig. 7.

Pairs of teeth on one strip locate centrally of the space between pairs of teeth on the other strip, the teeth being equi-spaced along the length of the assembly. That is to say, the distance between each pair of teeth is greater than that between the teeth of a pair.

Alternate ones of the teeth 31 are set outwardly as indicated at 42 in Fig. 8 whilst the others are set inwardly as indicated at 43. In similar manner, alternate teeth of teeth 32 are also set outwardly as indicated at 44 in Fig. 6, the remaining teeth being set inwardly as indicated at 45. Thus, in each pair of teeth, one tooth is bevelled on its inside face and set outwardly while the other tooth of the pair is bevelled on its outside face and set inwardly. The outward sets are sufficient to ensure that the teeth points lie externally of the faces of the outer strips 29, 30 as can be seen from Fig. 6 and externally of the faces of the support 5. This allows for the clearance of saw dust produced during sawing and reduces friction between the faces of the blade assembly and the faces of the saw cut.

In one form of blade assembly shown in Figs. 5, 6 and 7, the strips 29, 30 are of a thickness of about 0.7 mm and of a depth, as measured from the upper edge to the tooth points, of about 20 mm. The depth of each tooth as measured from root to point is about 5.0 mm. The depth of the slot 35 is about 6.0 mm.

The pitch of the teeth 31, 32 is about 24.0 mm. The first tooth of the teeth 31 lies at the left-hand end of strip 39 while the first tooth of teeth 32 is spaced from the left-hand end of strip 30 to give the tooth locations referred to above. At the other ends of the strips 29, 30, the extreme right-hand tooth is one of teeth 32. The included tip angle at the tooth point is about 42°.

The distance between adjacent teeth when the assembly is viewed from the side is about 6.0 mm.

The tooth configuration of the assembly shown in Figs. 5, 6 and 7 is suitable for general wood-cutting operations in timber and may also be used to cut other materials. The location of the tooth 37 at the distal end of the assembly enables plunge cutting to be carried out.

To secure the saw blade assembly in position in the saw, a tongue 5*a* along the lower edge of the support 5 is located in the gap 35 and the blade assembly is slid along the tongue until the reduced end portion 33 enters fully the slot 25. The screw in the hole 26 is then tightened to secure the portion 33 in the slot. The tongue 5*a* provides guidance and support for the saw blade assembly.

At the forward end of the saw blade assembly, a bearing disc 46 is shown mounted upon a spindle 47 and housed in a cut-away 50 in the tongue 5*a*. The spindle is supported, at its ends, in slots 48 in the outer blades 29, 30 and is free to roll along the upper edge of the inner strip 34 within limits set by the length of the slot. Those limits are set by the stroke of the blade assembly and must be sufficient to accommodate the stroke.

The disc 46 is also in contact with the upper edge 49 of the cut-away 50 in the support 5.

The presence of the disc 46 reduces friction between the wearing faces of the inner strip 34 and the blade support 5.

It is not essential to mount the disc 46 on a spindle, it could be loose. In that case, the slots 48 are not required.

The drive mechanism will now be described in more detail with reference to Figs. 8-10.

The member 20 has straight end portions

52 with a slot 53 also transverse to the length of the member 20.

The member 20 is mounted for reciprocatory movement in the bearings indicated diagrammatically at 21 in Figs. 8 and 10 which support the straight end portions 51.

Located in slot 53 is a roller 54 carried by a stub axle 55 secured at a position offset from the rotational axis 56 of a rotary driving member 18.

The member 18 has a lower disc-like component 57 that carries the stub axle 55 and an upper disc-like component 58 also disposed eccentrically with respect to axis 56. The eccentric orientation of the disc-like components 57, 58 also results in the static balancing of the member 18 carried by the shaft 17.

There remains, however, a degree of linear out-of-balance due to the reciprocation of the driving member 20 and the work piece driven thereby. The linear out-of-balance is compensated by forces set up by a counterbalance device that is reciprocated in anti-phase with respect to the driving member 20.

The counterbalance device 19 comprises a rectangular portion 59 driven by component 58 via a transverse slot 60 in the rectangular portion 59. The portion 59 carries transverse depending weights 61 at each end thereof.

The weights 61 are both slotted centrally as indicated at 62 in Fig. 9 and the ends 51 of the reciprocating member 20 nests in the slots 62 with a working clearance.

The driving member 18 is rotated by any suitable mechanism and as described above a driving gear wheel 16 is employed and is secured to or is integral with the member 18 and is rotated by the pinion 15 on the output shaft 11 of the driving motor at 2 in Fig. 9. The motor need not necessarily be disposed in the "in-line" position shown in Fig. 2.

Thus, as gear wheel 16 is rotated, member 20 is reciprocated by the action of the rotation of the lower disc-like component 57 in conjunction with the eccentrically positioned roller 54 and the slot 53.

At the same time, the counterbalance device 19 is also reciprocated by the action of the rotation of the upper disc-like component 58 in conjunction with the transverse slot 60 in the rectangular portion 59.

The reciprocatory movements of the member 20 and the device 19 are 180° out of phase. The physical dimensions of the device 19 and the distribution of its mass (mainly concentrated in the weights 61) are chosen in a manner such that the linear out-of-balance forces created by the member 20 and the tool piece and its drive are substantially offset by the linear out-of-balance forces created by the the device 19 and its drive.

There is thus provided counterbalancing not only of the out-of-balance forces produced during the rotation of driving member 18 but also of linear out-of-balance forces set up by the reciprocation of member 20 and the work piece carried thereby.

It will be appreciated that the arrangement of the weights 61 which extend towards the drive member 20 enables the planes in which the centres of gravity of the counterbalance device 59 and the drive member 20 reciprocate to be closely adjacent. This reduces the imbalance couple and the consequential vibration of the saw when in use.

The nesting of the drive member with the counterbalance device resulting from the location of the former in recesses in the latter reduces still further the space between the planes just referred to.

At the same time, the recesses provide guide surfaces which co-operate with the straight end portions 51 of the drive member 20 to guide the counterbalance device 19 as it reciprocates—a cost effective arrangement. As has been explained above, the member 20 is itself mounted for reciprocatory movement in the bearings 4 which control that movement closely.

The spacing of the masses 51 provides adequate clearance for the eccentric drive to the counterbalance device.

It will be appreciated that the nesting of the reciprocatory member in the slots 51 also reduces the space required to accommodate the balance weight and also provides linear guidance for the shaft 49.

The physical size and mass distribution of the counterbalance device 59 are chosen to compensate substantially completely for the linear out-of-balance forces produced by the member 1 and the saw blade assembly 23 and thereby to minimise the overall vibration of the tool whilst in use. The tool is therefore more comfortable to use.

It will be appreciated that other forms of saw blade than the composite assembly described above can be used. A blade with a single row of teeth and suitably contoured to coact with a blade support and guide can be used instead. Such a blade is referred to herein as a blade assembly. Examples of other suitable blades and blade assemblies and supports therefore are found in U.K. Patent Applications Nos. 85.16809 and 85.16810.

The power saw may also be bench-mounted either on a mounting that enables it to be brought down on to a work piece or in a manner enabling a work piece to be offered up to the blade.

CLAIMS

1. A power saw comprising a housing, a saw blade support extending from the housing and having surfaces for supporting and guiding a saw blade, means in the housing for reciprocating the saw blade along the support, and, bearing means additional to the said surfaces between the support and the saw blade.

2. A power saw as claimed in claim 1 in which the bearing means are accommodated by the support member.

3. A power saw as claimed in claim 1 or 2 in which the bearing means are located at or adjacent that end of the support member remote from the housing.

4. A power saw as claimed in any one of the preceding claims in which the bearing means comprises a bearing disc.

5. A power saw as claimed in claim 4 in which the disc is housed in a cut-away in the support.

6. A power saw as claimed in claim 5 in which the disc is carried upon a spindle whose ends are located in slots in the saw blade.

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